HEALTH RISKS FROM PAST OPERATIONS OF THE ROCKY FLATS PLANT ARE LOW

Introduction

The most comprehensive risk assessment ever performed for Rocky Flats has just been completed. Known as The Rocky Flats Historical Public Exposures Studies, this 9-year research effort by the Colorado Department of Health and Environment identified and assessed health risks of past releases of radioactive materials and chemicals from the former Rocky Flats Nuclear Weapons Plant, located northwest of Denver, Colorado. The studies focused on estimating increased cancer risks to residents living or working in surrounding communities during the plant's operation from 1952 to 1989. The studies addressed only past releases that were carried off-site and led to exposure of the public and did not include possible releases after production ceased in 1989. Occupational exposures and health effects are addressed in other studies, many of which are described in DOE's public-use database, the Comprehensive Epidemiologic Data Resource (CEDR) at http://cedr.lbl.gov.

Background

For almost 40 years, nuclear weapons parts were produced at the Rocky Flats Plant, which is located on 11 square miles about 16 miles northwest of downtown Denver. This industrial facility used radioactive materials and more than 8,000 chemicals in its operations. From 1952 to 1989, Rocky Flats workers used plutonium to build nuclear weapons triggers, called "pits." The pits were shipped to Texas to be incorporated into weapons. Working with plutonium metal is difficult. The metal can spontaneously catch on fire when exposed to air causing near by materials to ignite. The type of plutonium examined in the studies was weapons grade (mainly plutonium-239, -240), which remains in the environment for thousands of years.

The plant also used other materials such as uranium and beryllium to make weapons parts. Other chemicals such as carbon tetrachloride, a cleaning solvent, were used in large quantities in the manufacturing processes. Precautions were taken to control particulate toxic substances. For example, air was filtered in buildings before it was released to the environment, to reduce the amounts of airborne contaminants. However, minimal effort was made to keep carbon tetrachloride from being released into the atmosphere. Workplace accidents, spills, fires, emissions, leaking storage containers and day-to-day operations allowed plutonium and many chemicals to be released from the plant site. Rocky Flats stopped weapons production in 1989, and cleanup of contamination at the site began in 1992.

Results of the Studies

The results of these studies are based on information that researchers obtained from their review of thousands original records and reports. Researchers had to locate and interpret many types of documents, including historical monitoring data, classified reports, meteorological charts from Rocky Flats and similar information from a variety of sources. The use of data from multiple sources and in various forms helped researchers substantiate and verify needed information. For

example, more than 100 Rocky Flats employees, retirees and others were interviewed about the plant's activities. Meteorological data from several locations were used in the computer modeling of the travel in the air given different weather patterns.

The key findings of the studies are summarized as follows:

- Plutonium, a radioactive metal, was one of the contaminants of primary concern released from Rocky Flats. The largest amounts of plutonium released from Rocky Flats into nearby communities came from a fire at the plant in 1957 and from a waste oil storage area in the late 1960s. Between 10 and 50 curies (or between 130 and 670 grams) of plutonium were released to the air. It traveled off-site, predominantly east of the plant, as confirmed by measurements of plutonium concentrations in soil.

- People who lived near the plant and led active, outdoor lifestyles (such as ranchers or laborers) had the highest level of exposure to airborne plutonium and the highest risk. The increased risk of developing cancer for people with this lifestyle ranges between in one hundred million and 1 in ten thousand, with a median value of 2.5 chances in a million. Researchers are confident that the true value for this risk has a 90 percent chance of being within this range. This risk is about the same as a person's increased risk from being exposed to the plutonium in fallout from US weapons testing.

- Carbon tetrachloride, a solvent used at Rocky Flats for cleaning and degreasing, was the major chemical of concern released from the plant. Between 1100 and 5400 tons were released. The increased cancer risk for a rancher/laborer was estimated to lie between 6 in ten million and 1 in one hundred thousand, with a median value of 2.5 in a million. This is comparable to this person's risk estimated for plutonium exposure.

- An individual's location, lifestyle and period of exposure were found to have a greater effect on health risks than gender or age. For example, people who moved to areas near Rocky Flats after 1970 were exposed to much smaller concentrations of plutonium, and people who spent more time indoors had smaller risks than a person who worked outdoors all day, such as a laborer or rancher.

- The greatest off-site exposure to plutonium and carbon tetrachloride resulted from people breathing contaminants released into the air. Other exposure pathways, such as ingesting water, vegetables and meat, and through skin contact were found to be significantly smaller than exposures from breathing plutonium.

- The main health risk of inhaled plutonium is cancer of the organs in which plutonium deposits after being inhaled. These include the lungs, liver, bone and bone marrow.

- Carbon tetrachloride exposure may cause liver cancer, but this has only been demonstrated at high doses in experimental animal studies.

- Other materials examined in some detail included beryllium, dioxin, uranium, and tritium. Health risks due to releases of these materials from Rocky Flats were considerably less than risks from plutonium or carbon tetrachloride.

Conclusions

The cancer risks from all materials studied are low compared to cancer risks from other causes. For this reason, follow-up epidemiologic studies were not recommended. Study participants recommend that federal, state and citizen organizations actively monitor current and future operations at the site to prevent unnecessary off-site exposures from occurring in the future..

More Information

More information, including maps of the study area with superimposed cancer risks, is available through the Colorado Department of Health and Environment web site at:

http://www.cdphe.state.co.us/

The detailed findings of the Historical Public Exposures Studies on Rocky Flats are available in more than 30 technical reports. These reports, as well as citizen summaries of the technical reports, technical topic papers on scientific concepts and supporting information, are available from the Colorado Department of Health and Environment by calling (303) 692-2700.